The 2nd International Symposium on Nuclear Energy (ISNE-09)
October 26-28, 2009 • Amman, Jordan
"Nuclear Safety, Security and Human Resources" – Nuclear Education, Tutoring and Training

The NUCLEONICA nuclear science portal for knowledge management, education, and training (www.nucleonica.net)

J. MAGILL

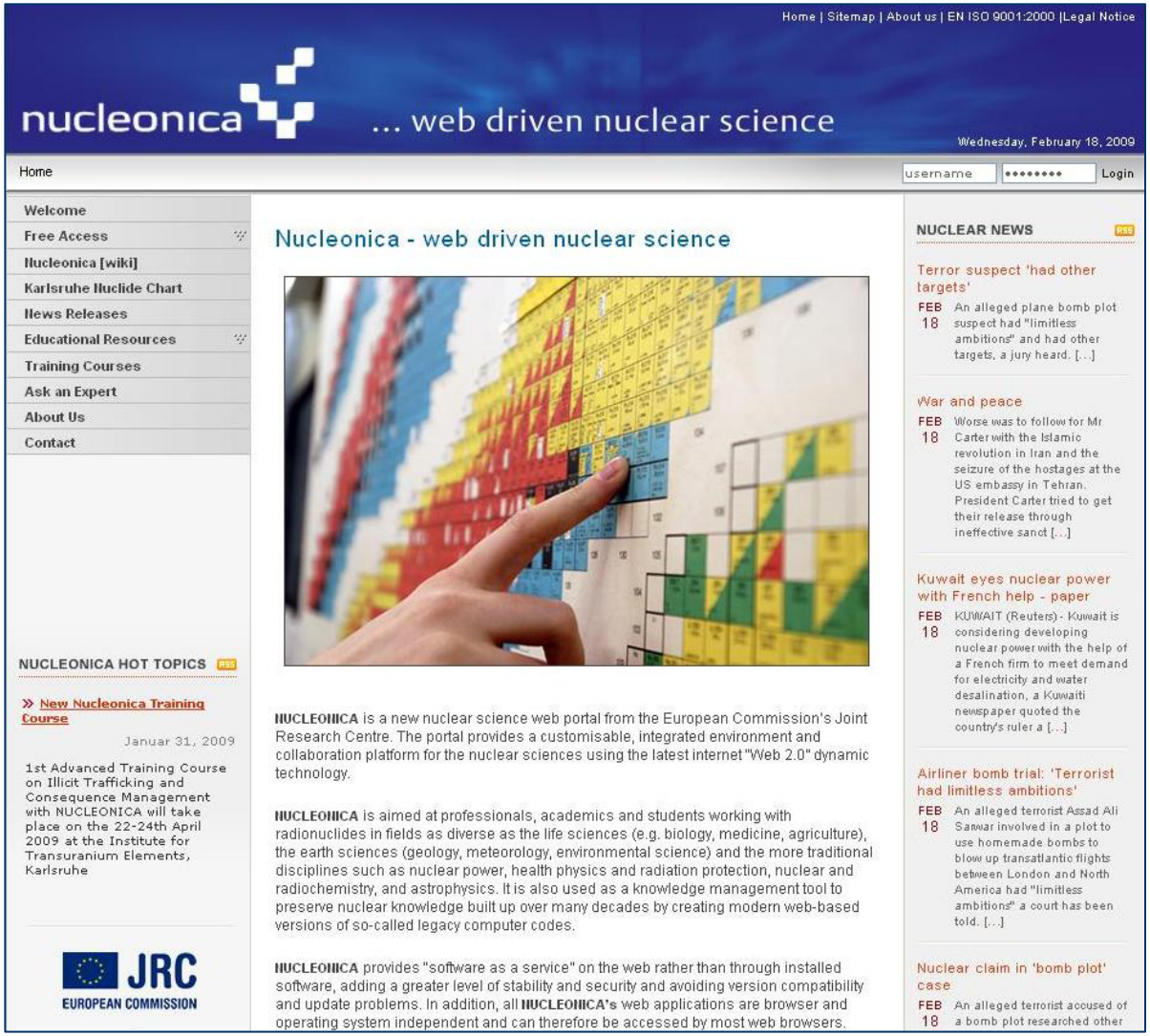
European Commission, Joint Research Centre,
Institute for Transuranium Elements,
Postfach 2340, 76125 Karlsruhe, Germany

nucleonica

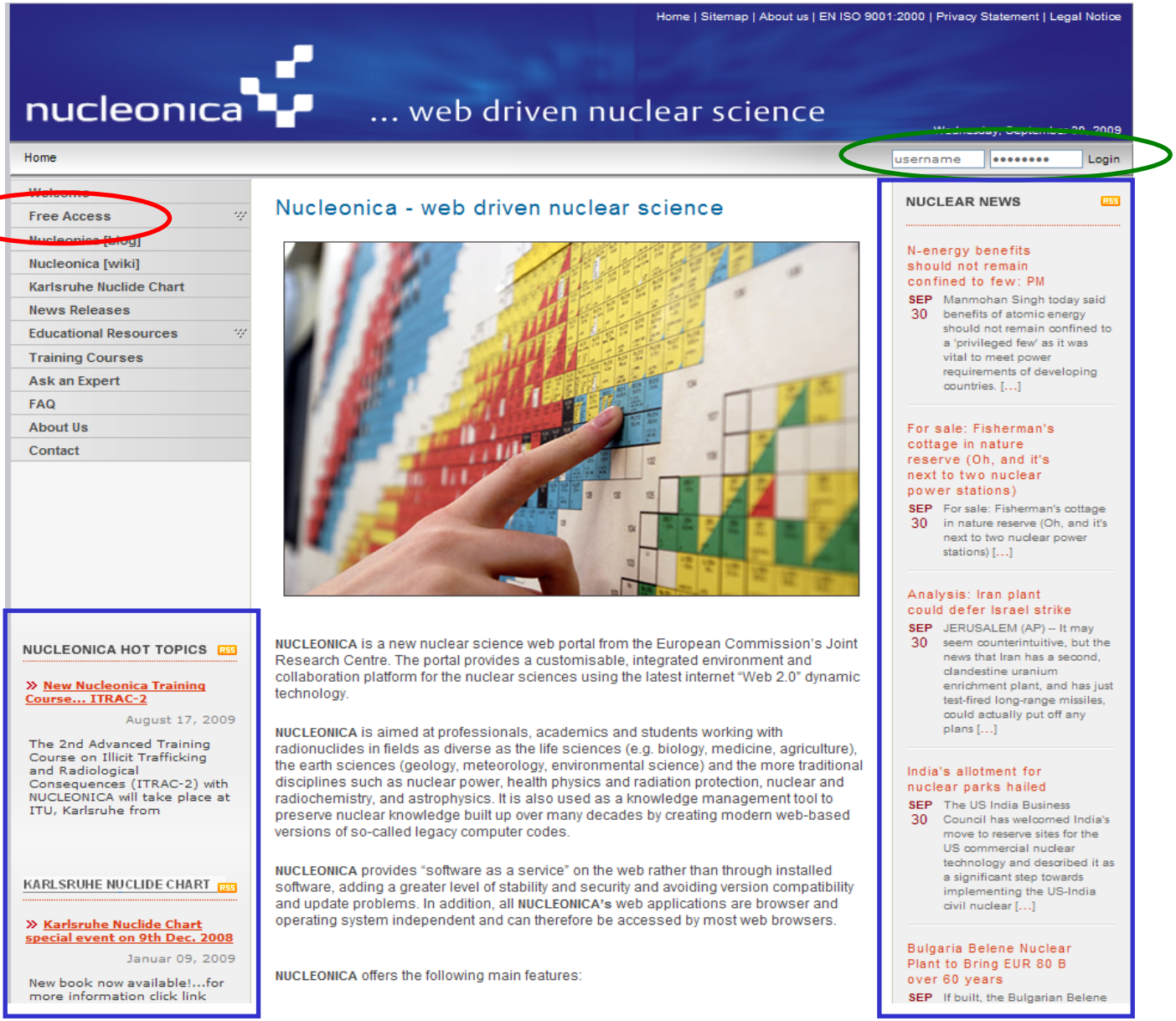
What is NUCLEONICA?

- NUCLEONICA is a new nuclear science web portal from the European Commission's Joint Research Centre. The portal provides a customisable, integrated environment and collaboration platform for the nuclear sciences using the latest internet "Web 2.0" dynamic technology.

- NUCLEONICA is aimed at professionals, academics and students working with radionuclides in fields as diverse as the life sciences (e.g. biology, medicine, agriculture), the earth sciences (geology, meteorology, environmental science) and the more traditional disciplines such as nuclear power, health physics and radiation protection, nuclear and radiochemistry, and astrophysics.



Nucleonica…


Home | Sitemap | About us | EN ISO 9001:2000 | Privacy Statement | Legal Notice
nucleonica
… web driven nuclear science
Home
username
Login
Free Access
Nucleonica [wiki]
Karlsruhe Nuclide Chart
News Releases
Educational Resources
Training Courses
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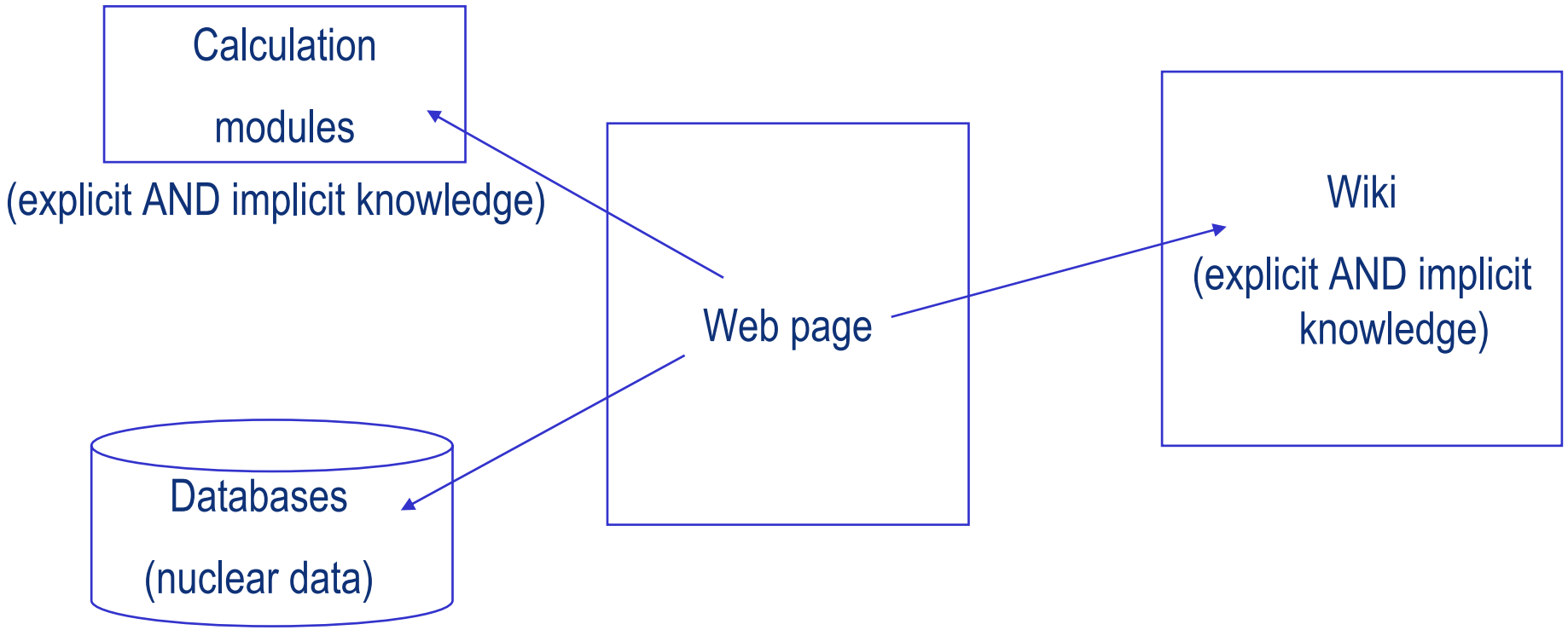
Nucleonica - web driven nuclear science
NUCLEONICA HOT TOPICS
» New Nucleonica Training Course... ITRAC-2
August 17, 2009
The 2nd Advanced Training Course on Illicit Trafficking and Radiological Consequences (ITRAC-2) with NUCLEONICA will take place at ITU, Karlsruhe from
KARLSRUHE NUCLIDE CHART
» Karlsruhe Nuclide Chart special event on 9th Dec. 2008
Januar 09, 2009
New book now available!...for more information click link
NUCLEONICA is a new nuclear science web portal from the European Commission's Joint Research Centre. The portal provides a customisable, integrated environment and collaboration platform for the nuclear sciences using the latest internet "Web 2.0" dynamic technology.
NUCLEONICA is aimed at professionals, academics and students working with radionuclides in fields as diverse as the life sciences (e.g. biology, medicine, agriculture), the earth sciences (geology, meteorology, environmental science) and the more traditional disciplines such as nuclear power, health physics and radiation protection, nuclear and radiochemistry, and astrophysics. It is also used as a knowledge management tool to preserve nuclear knowledge built up over many decades by creating modern web-based versions of so-called legacy computer codes.
NUCLEONICA provides "software as a service" on the web rather than through installed software, adding a greater level of stability and security and avoiding version compatibility and update problems. In addition, all NUCLEONICA's web applications are browser and operating system independent and can therefore be accessed by most web browsers.
NUCLEONICA offers the following main features:
NUCLEAR NEWS
N-energy benefits should not remain confined to few: PM
SEP 30 Manmohan Singh today said benefits of atomic energy should not remain confined to a 'privileged few' as it was vital to meet power requirements of developing countries. […]
For sale: Fisherman's cottage in nature reserve (Oh, and it's next to two nuclear power stations)
SEP 30 For sale: Fisherman's cottage in nature reserve (Oh, and it's next to two nuclear power stations) […]
Analysis: Iran plant could defer Israel strike
SEP 30 JERUSALEM (AP) -- It may seem counterintuitive, but the news that Iran has a second, clandestine uranium enrichment plant, and has just test-fired long-range missiles, could actually put off any plans […]
India's allotment for nuclear parks hailed
SEP 30 The US India Business Council has welcomed India's move to reserve sites for the US commercial nuclear technology and described it as a significant step towards implementing the US-India civil nuclear […]
Bulgaria Belene Nuclear Plant to Bring EUR 80 B over 60 years
SEP If built, the Bulgarian Belene

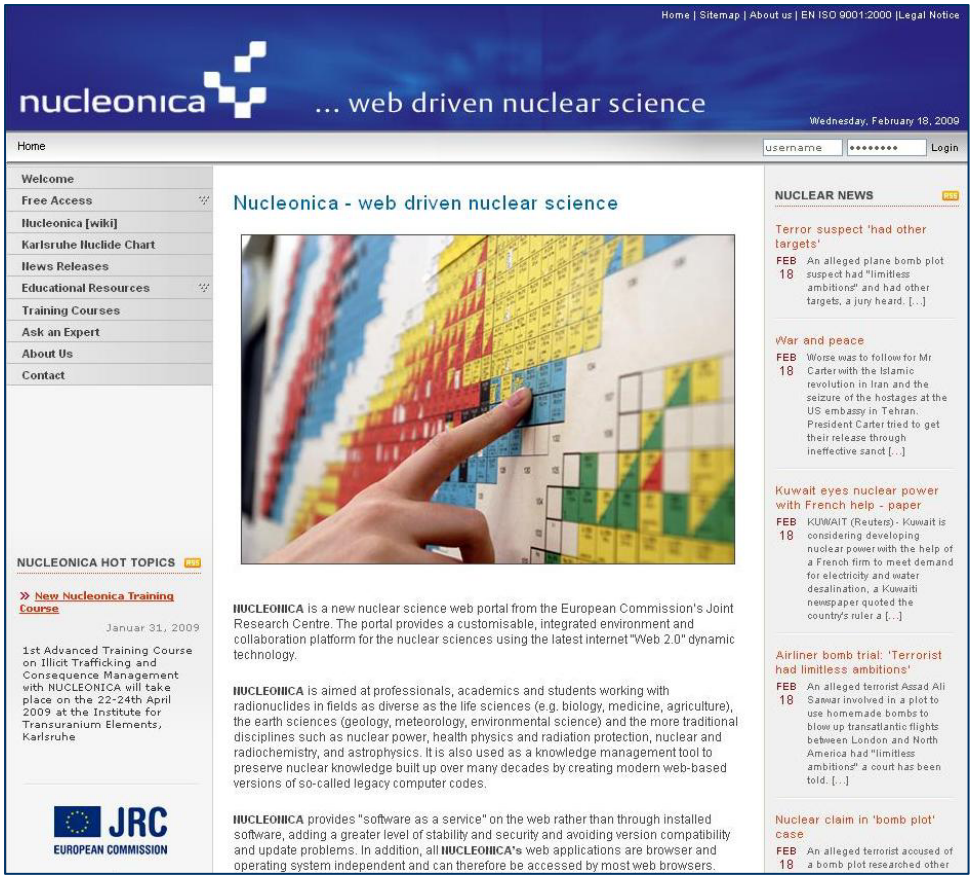
Nucleonica Architecture & Logical Structure…



The NUCLEONICA Structure

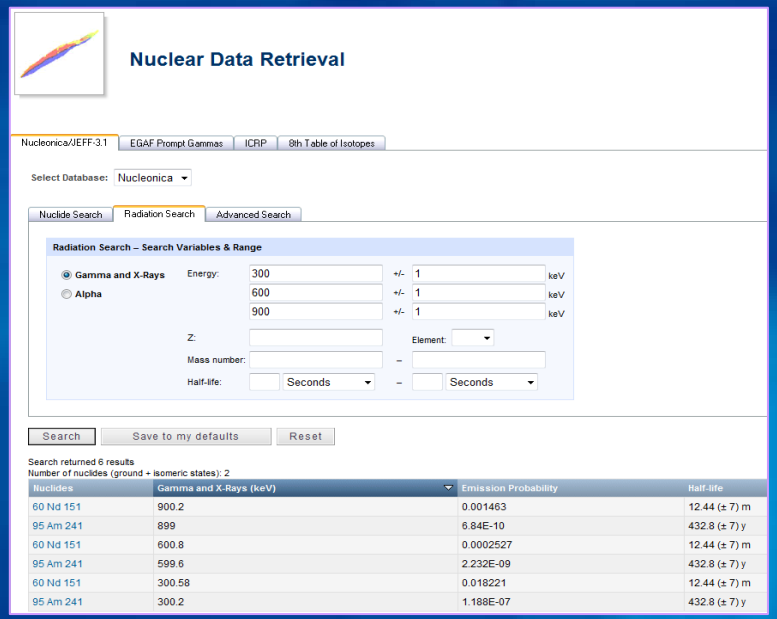
NUCLEONICA

- NUCLEONICA's "Learning Centres"
- Unique feature: Web-based Nuclear Science Applications
- New Approach to Knowledge Management, Education and Training: use of social networking tools
- NUCLEONICA as a platform for scientific applications development

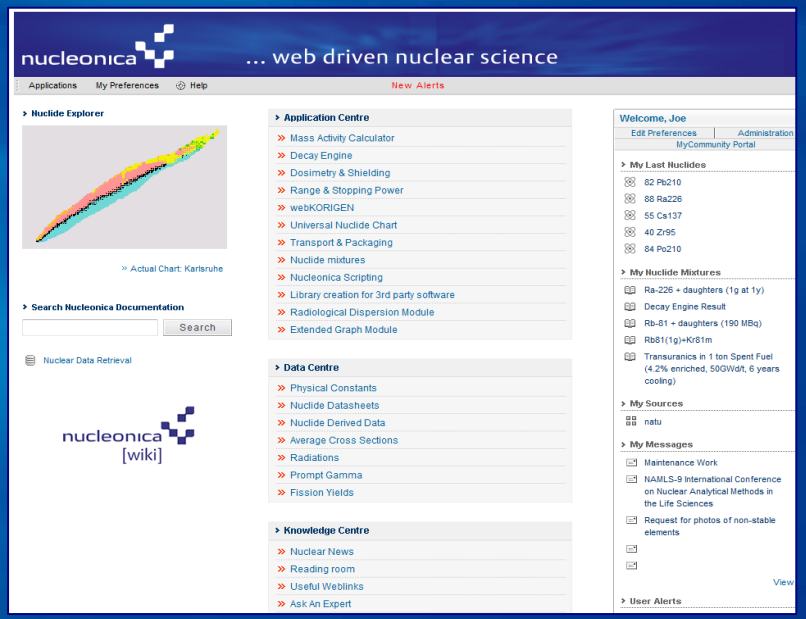


Four Pillars of NUCLEONICA: Nucleonica's "Learning Centres"

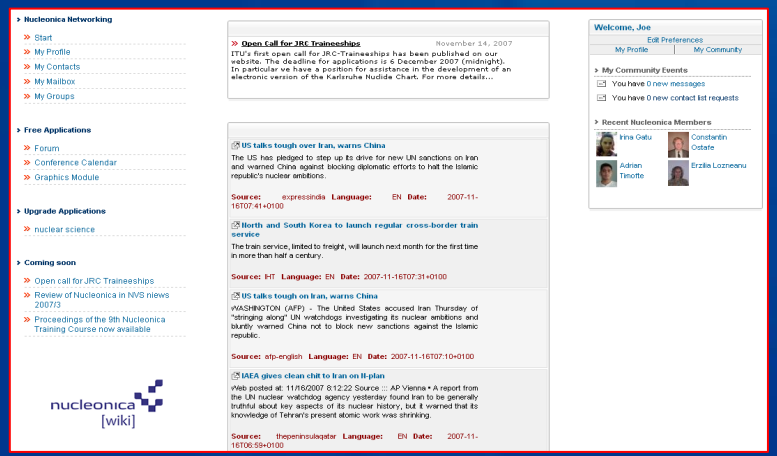
- Data Centre



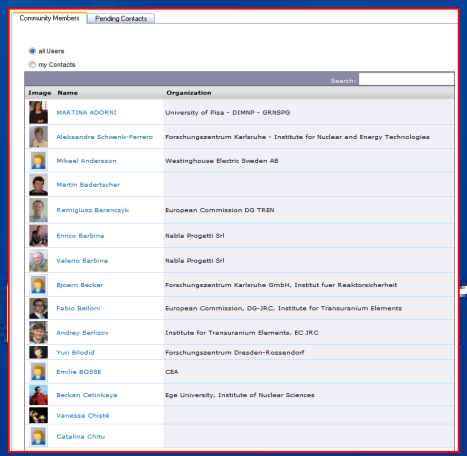
- Application Centre

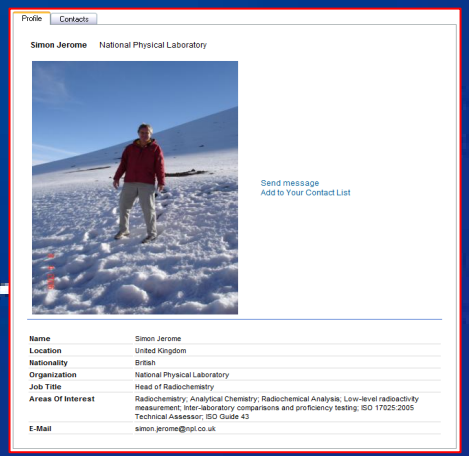


- Knowledge Centre

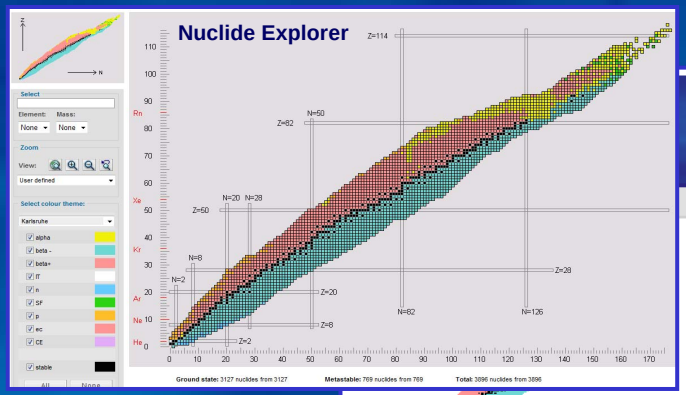


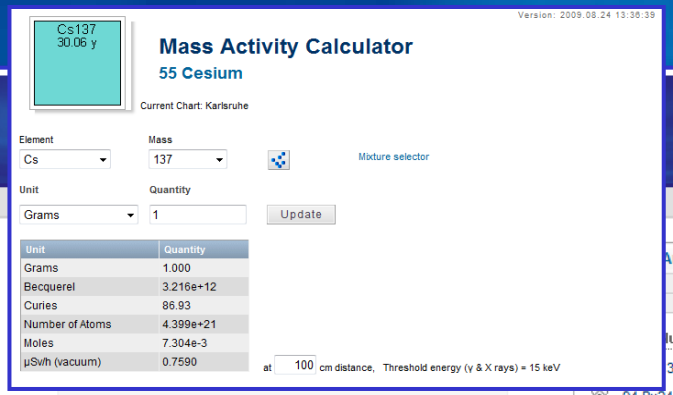
- Community/Networking Centre

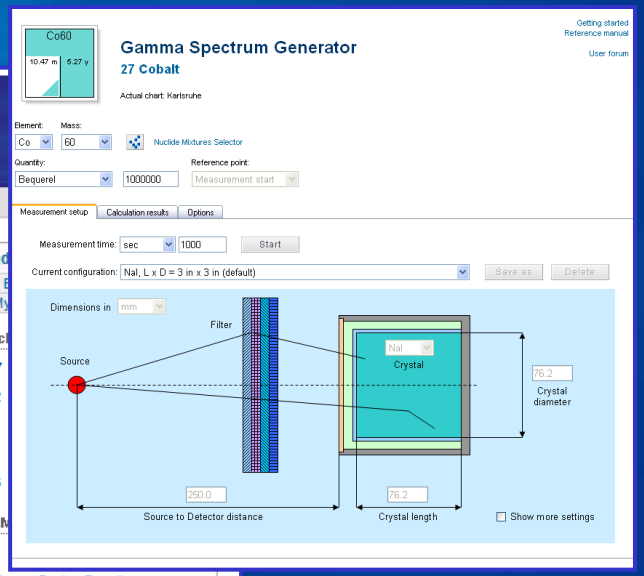


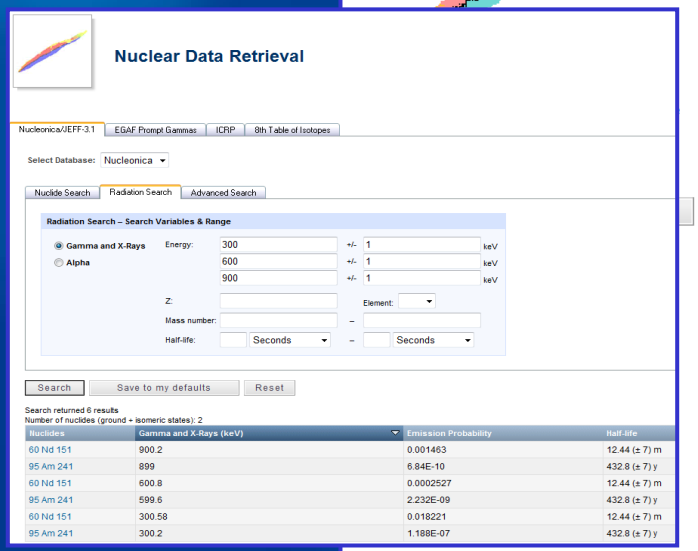


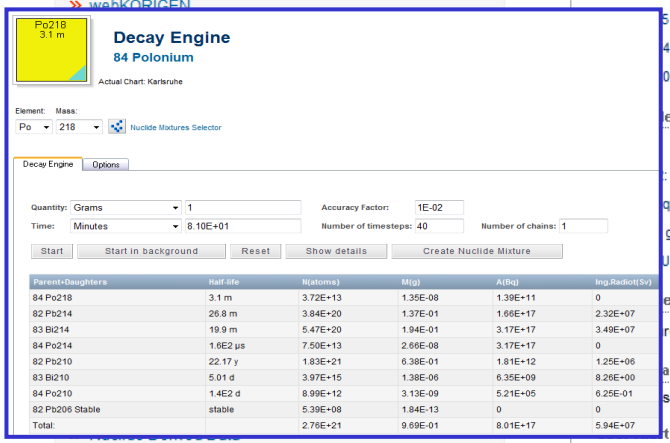
Nucleonica's unique feature: Web-based Nuclear Science Applications

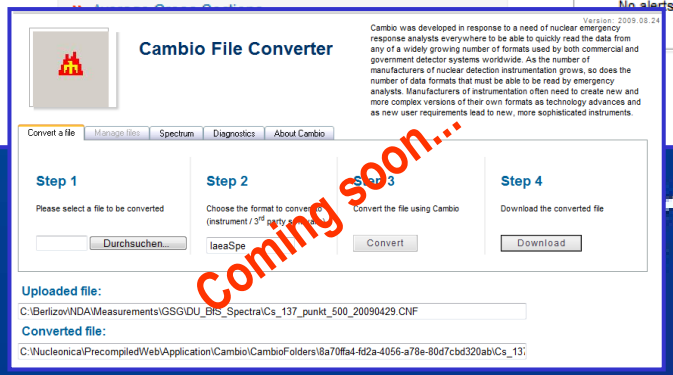




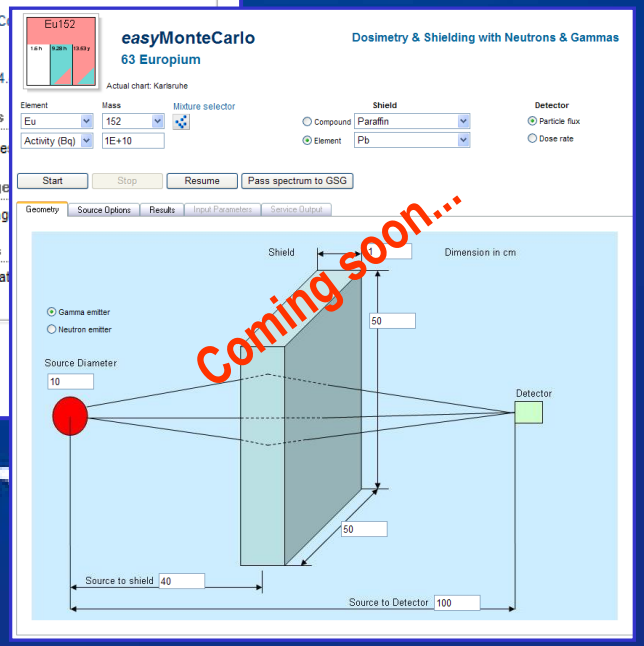








Coming soon...



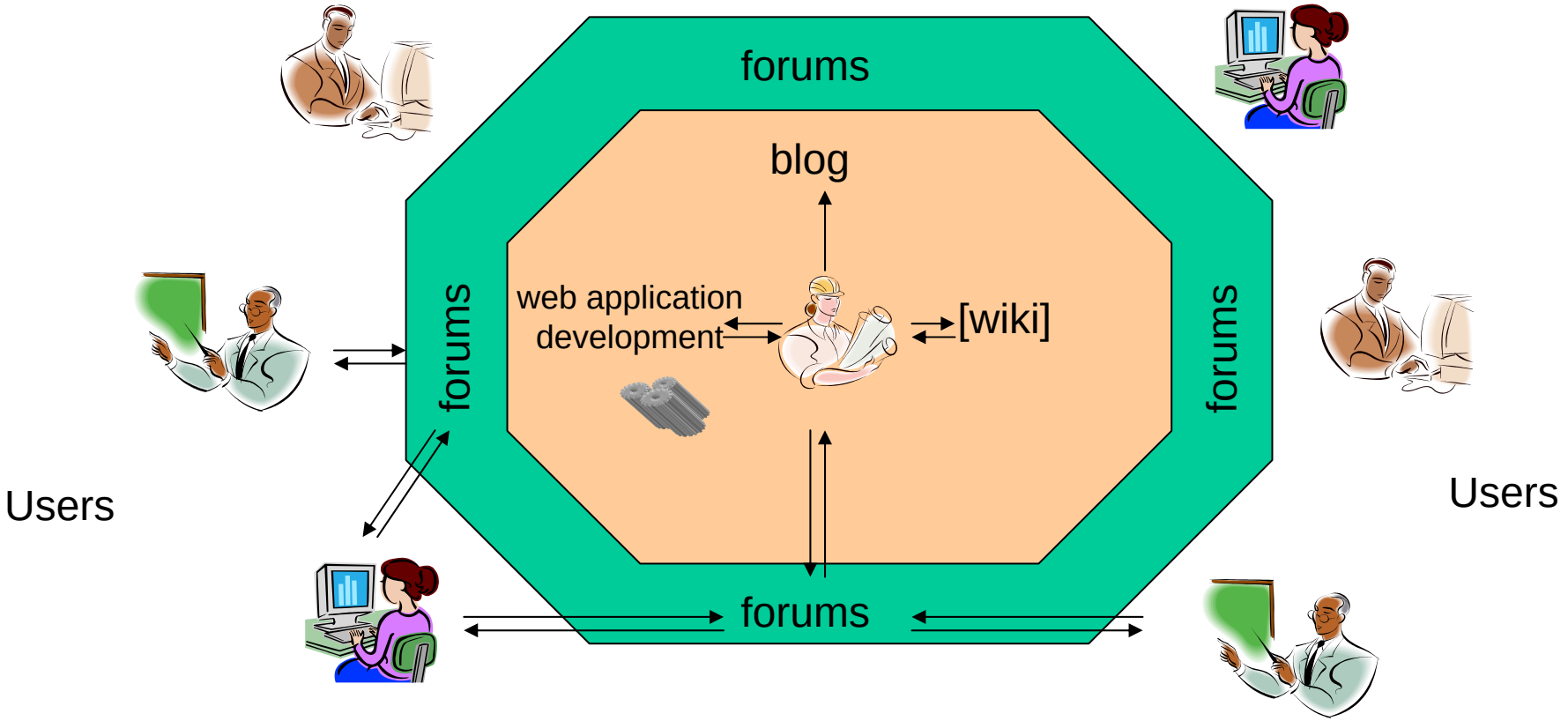
Coming soon...

Other Applications:

- Dosimetry & Shielding,
- Range & Stopping Power,
- webKORIGEN...

NUCLEONICA Knowledge Management: Tacit ➔ Explicit Knowledge

through the development of communities around the scientific applications (based on Web 2.0 tools)



NUCLEONICA as a platform for scientific applications development

- Currently NUCLEONICA consists of individual modules
- Modules can be “combined” for batch processing through the NUCLEONICA scripting language
- Open up NUCLEONICA to external developers

  checklist of tools required:

  - access to the NUCLEONICA databases
  - a testing environment where the developer and the NUCLEONICA team can test new application
  - an upload facility whereby the developer can upload the application to the NUCLEONICA platform

Are you interested in having your application hosted on Nucleonica?
Contact us…

nucleonica

October 2007 Karlsruhe

[edit]

9th Nuclear Science Training Course with Nucleonica, 25/26th Oct. 2007, Ostendorfhaus, Karlsruhe

The 9th Nuclear Science training course on Radioactivity, Radionuclides and Radiation with Nucleonica was held at the Ostendorfhaus, Karlsruhe from the 25th to 26th October, 2007. The two-day course provided a general introduction to the recently released Nucleonica: the new science networking and applications portal. Nucleonica is a powerful and versatile web-based software package for the nuclear science community. With examples and exercises, a variety of core and topical issues in nuclear science and technology were presented by experts in their respective fields.

A total of twenty-nine participants, around half of them women, with a diverse range of backgrounds attended the course. There were participants from Azerbaijan, Belgium, Bulgaria, Czech Republic, Poland, Romania and Turkey. In addition there were 10 participants form the Institute for Transuranium Elements. Among them were students, academics and industry professionals from fields such as nuclear medicine, radiation protection, environmental radioactivity and reactor physics.

Final Agenda 25th Oct. 2007

How to get from the hotel to the conference training centre

Links to the presentations and exercises:

Networking with Nucleonica (J. Magill) Exercises

Nuclear Data (J. Galy) Exercises

Nuclide Charts (C. Normand) Exercises

Decay Engine (A. Berlizov) Exercises

Dosimetry & Shielding (J. Galy) Exercises

Nuclear Forensics & Illicit Trafficking (K. Mayer) Exercises

Overview of the Institute for Transuranium Elements (F. Wastin)

Advanced Nucleonica Features (J. Magill)

Training Course Feedback

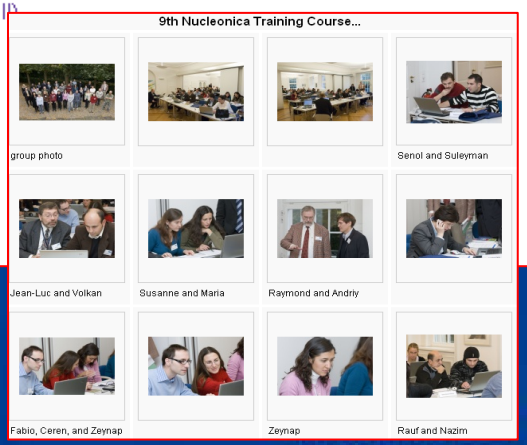
QM Questionnaire

Course Certificate

List of Participants

Gallery

Group Photo Oct. 2007, Ostendorfhaus Karlsruhe

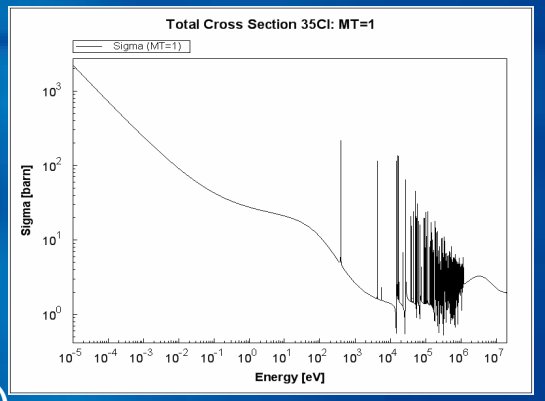


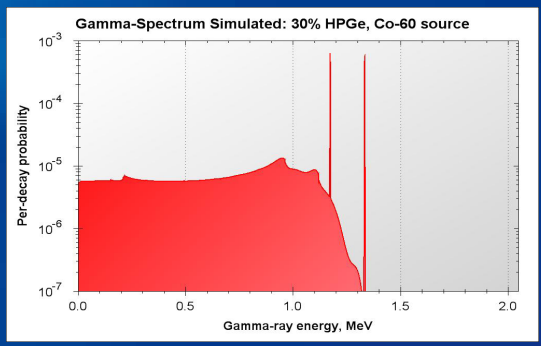
nucleonica

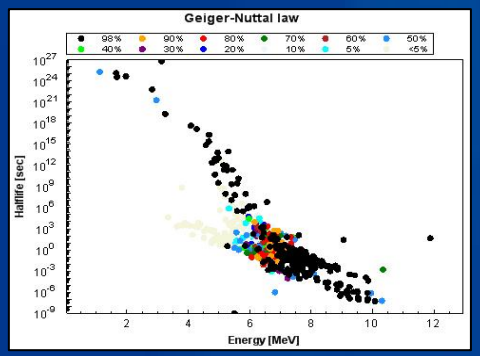
webGraphics…

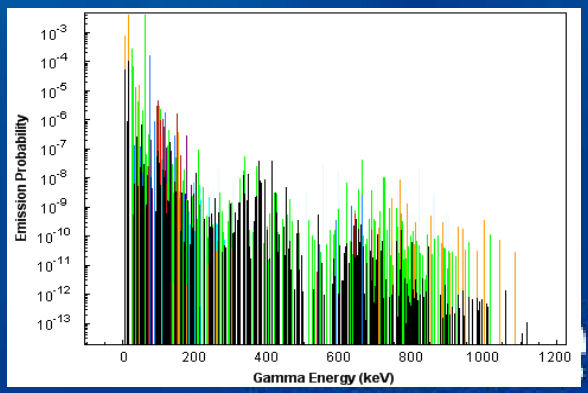
The Nucleonica webGraphics Features:

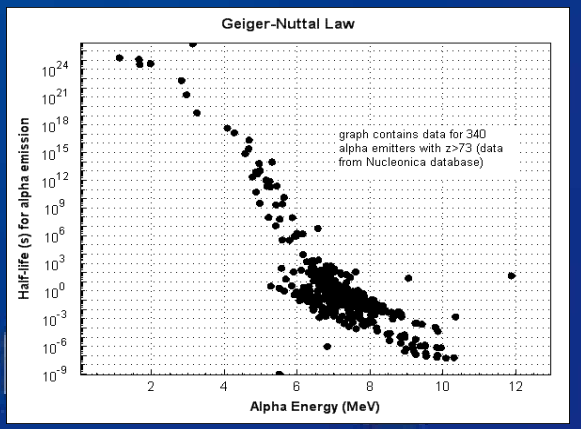
- No need to buy expensive commercial software
- Easy to use
- Delivers publication quality scientific graphs
- Variety of formats available (gif, jpg, emf, eps, png, svg)
- Graphics configuration can be stored for future use
- Available at any time from any location
- Under constant further development



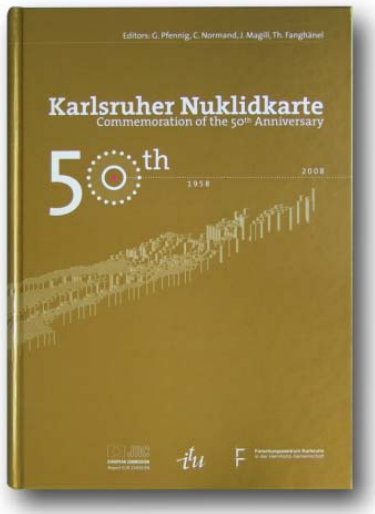


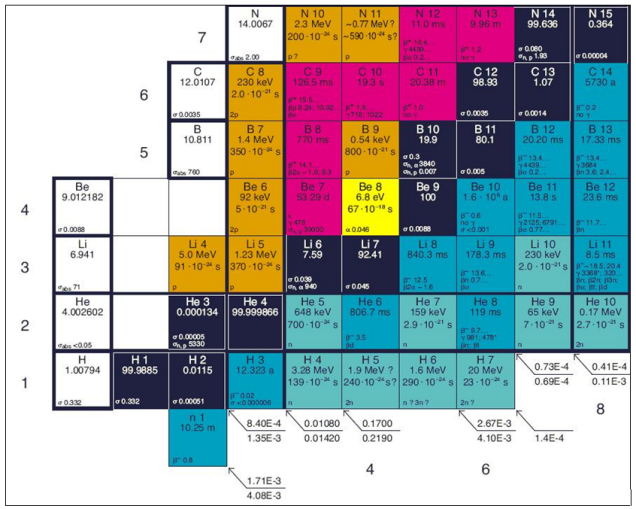






Karlsruhe Nuclide Chart…





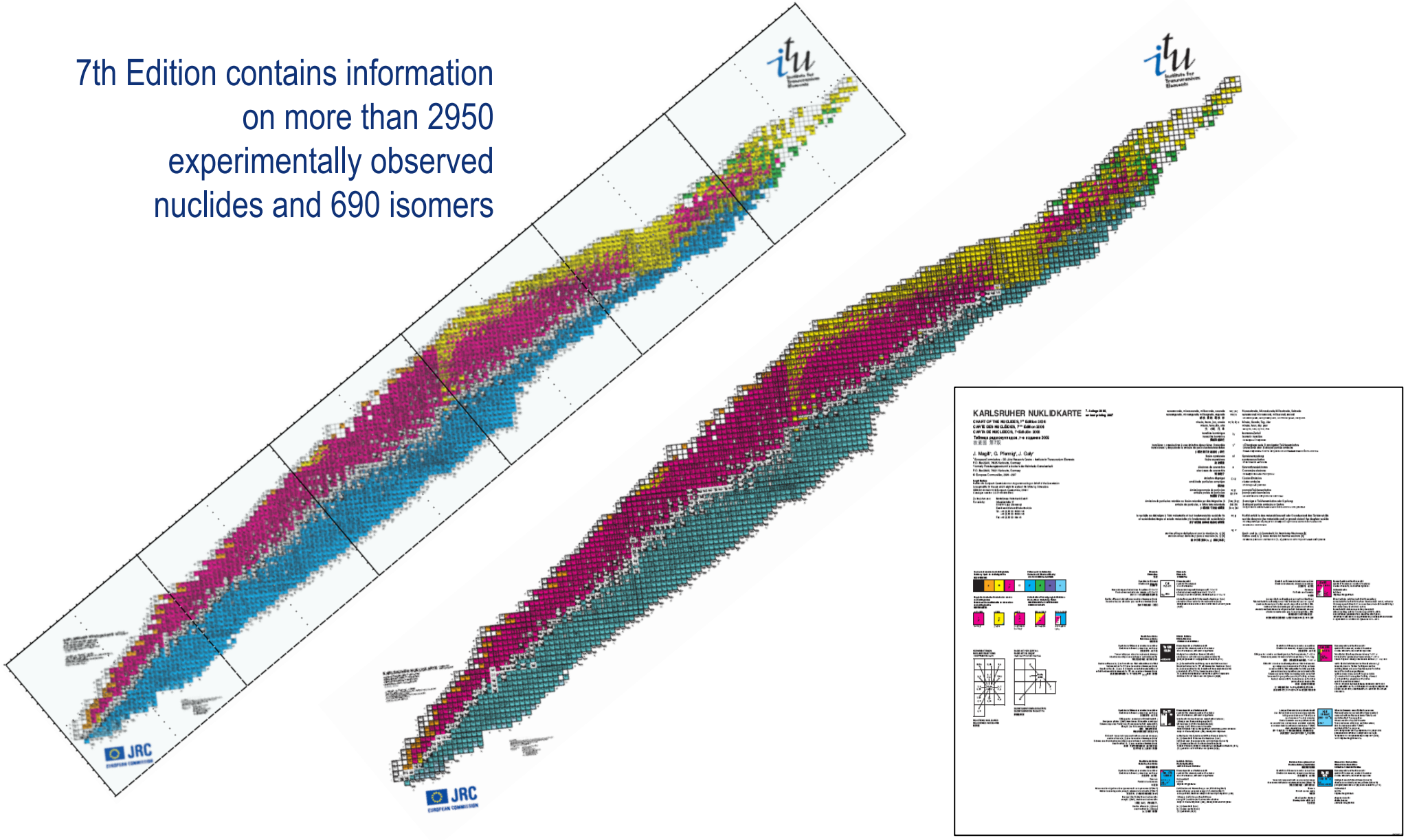
Use of colours in the Karlsruhe Nuclide Chart:

Already in the first Edition of the Karlsruhe Chart of the Nuclides, colours were used to indicate the decay modes

black = stable nuclide;
yellow = α-decay;
red = ß$^+$ decay or electron capture;
blue = ß$^-$ decay;
white = isomeric transition).

Karlsruhe Nuclide Chart…

7th Edition contains information on more than 2950 experimentally observed nuclides and 690 isomers



Highlights:

Gamma Spectrum Generator

webKORIGEN

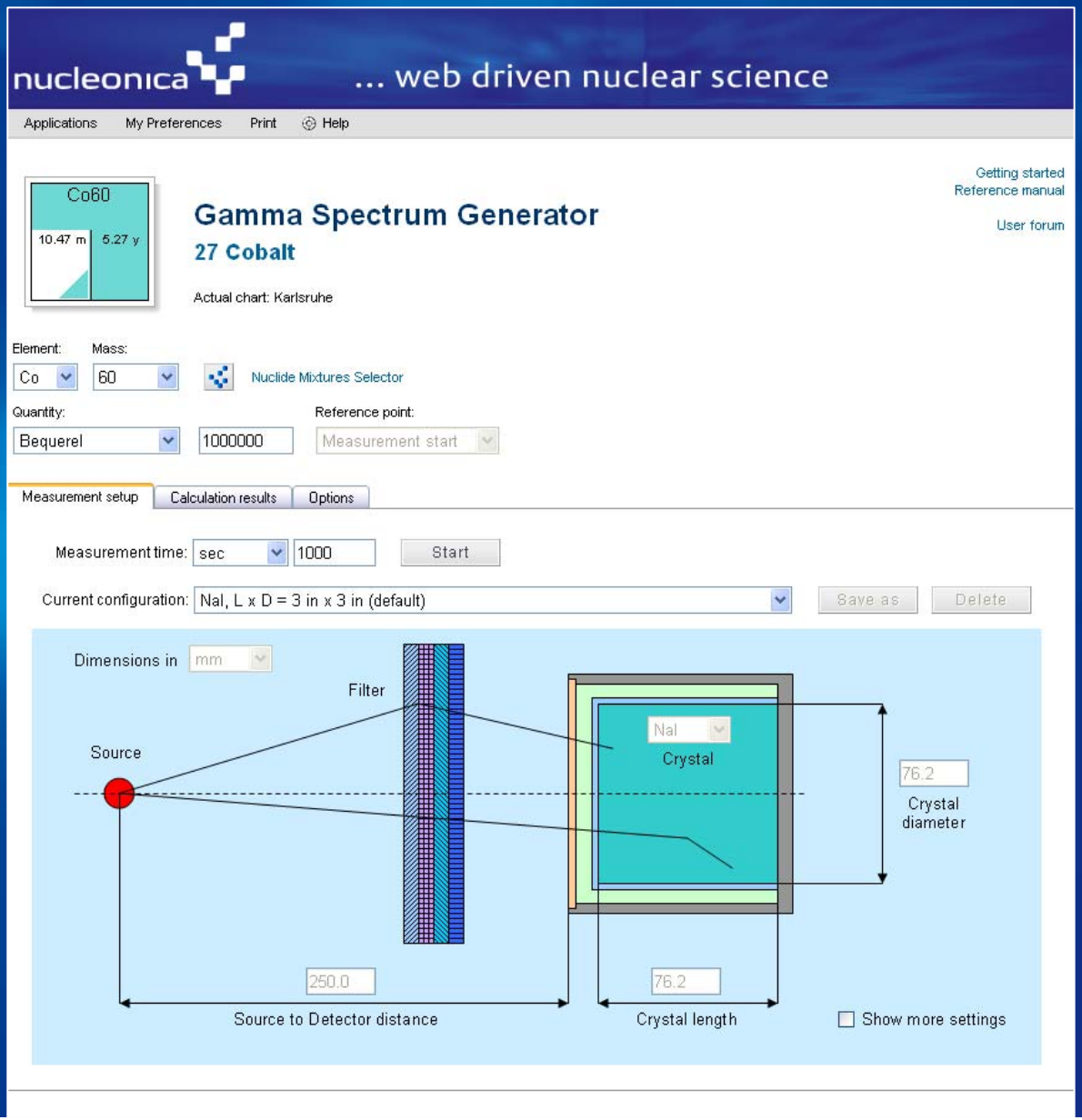
Gamma Spectrum Generator… can be used to simulate the gamma spectrum of radioactive substances with a variety of detectors (e.g. NaI, HPGe, etc.). The simulator presents an efficient visual teaching aid that is especially useful in training facilities which have restrictions on the use of radioactive substances, or when sources of special interest are not available.

of interests for…

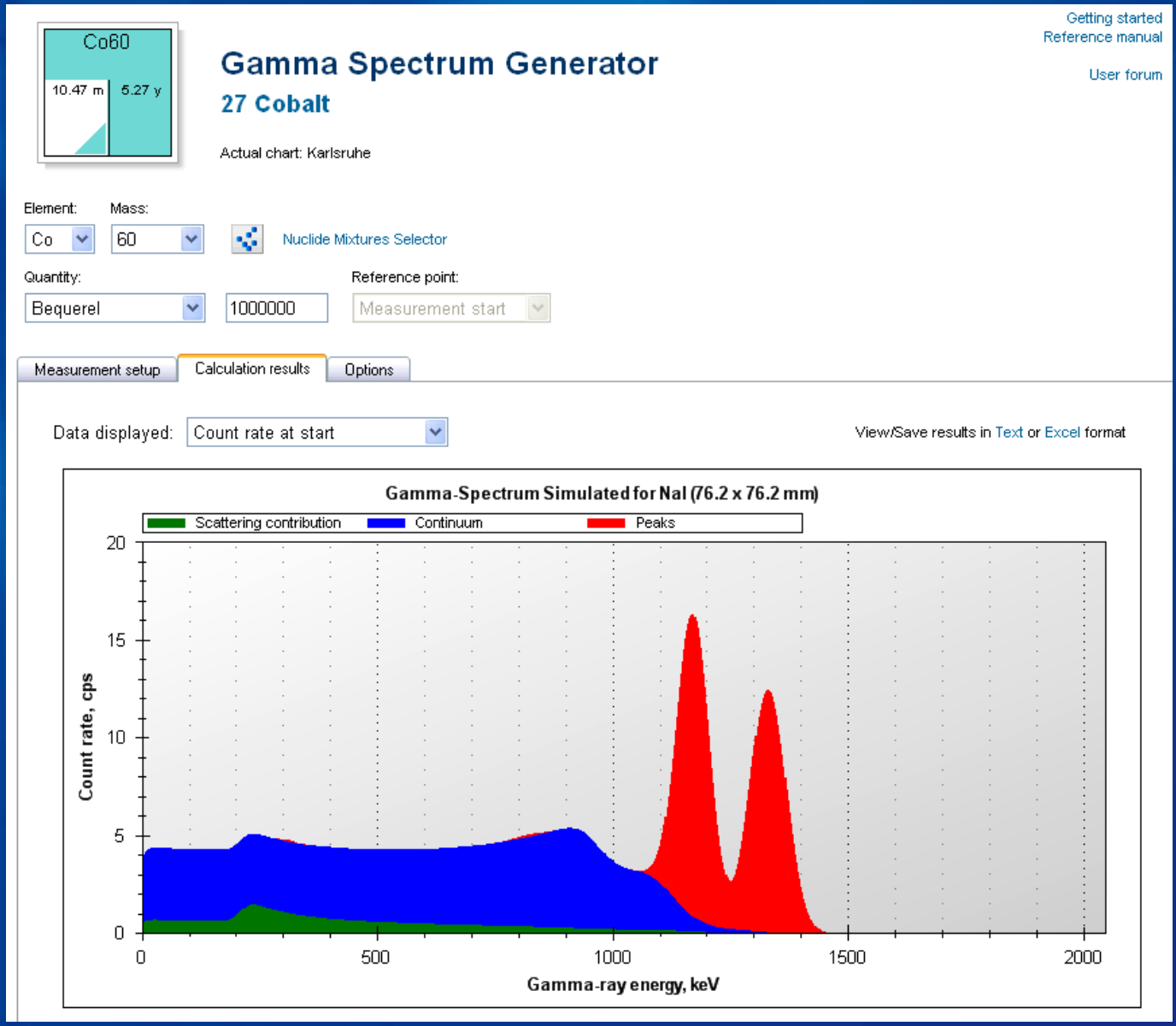
- nuclear and radio-chemists,
- health physicists,
- nuclear facility operators,
- radiation protection staff,
- safeguards inspectors,
- border police,
- customs and law-enforcement officers.

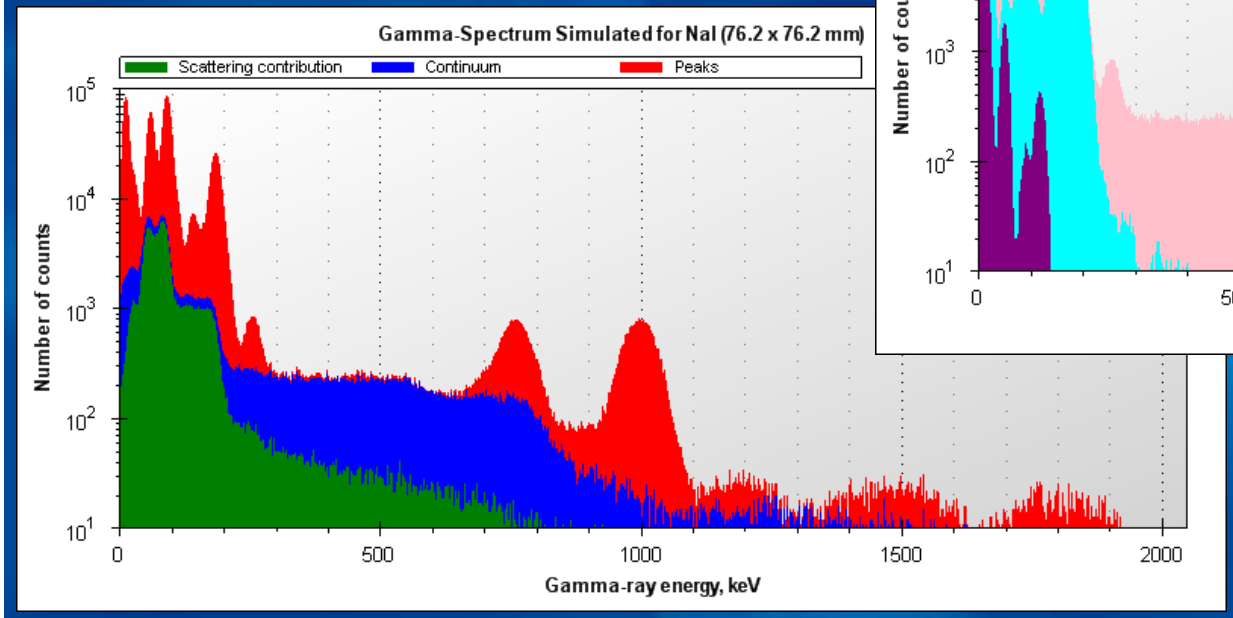
Needs for **Education & Training** in these areas are high and, obviously, they will be increasing in the future as new challenges arise, such as

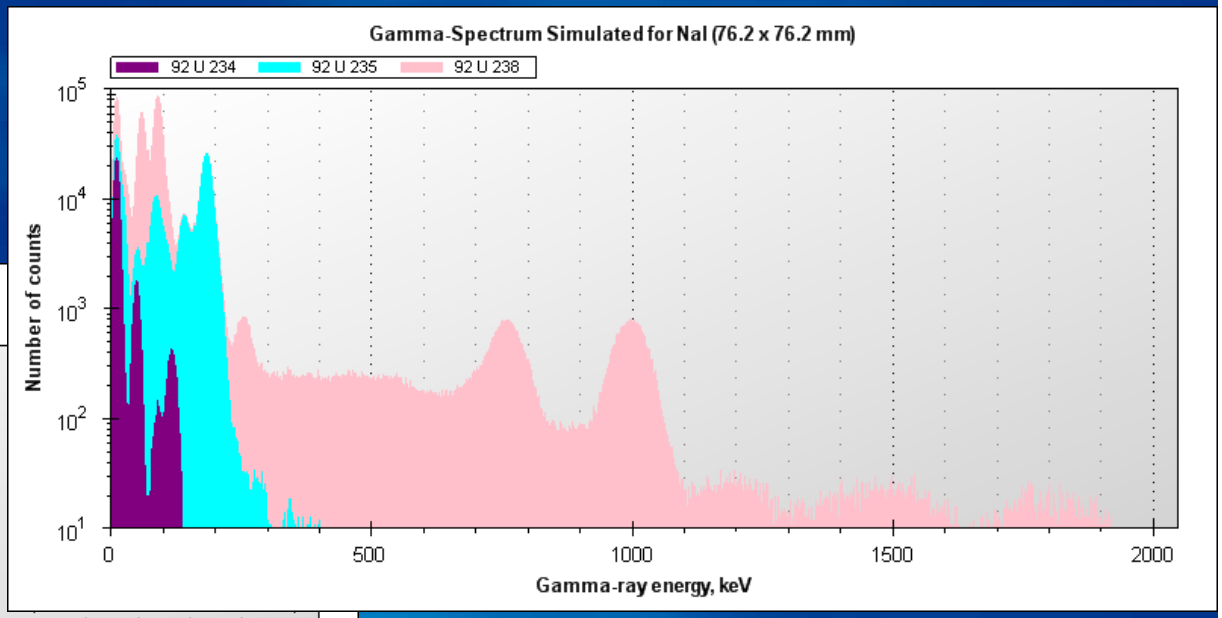
- strengthening international safeguards and security,
- nuclear terrorism prevention



This “one-click” calculation simulates the spectrum for a 10 MBq ^{60}Co γ-source located at 25 cm distance from unshielded 3" x 3" NaI detector. A typical result of the calculation is shown…







The *γ*-spectrum modelled for a 10-year-aged natural U sample and 3"×3" NaI detector. The two diagrams show different presentations of the same spectrum. The top diagram shows the separate contributions form the parent and daughters of U-234, U-235, U-238. The bottom diagram shows the contributions from the peak and continuum components of the spectrum.

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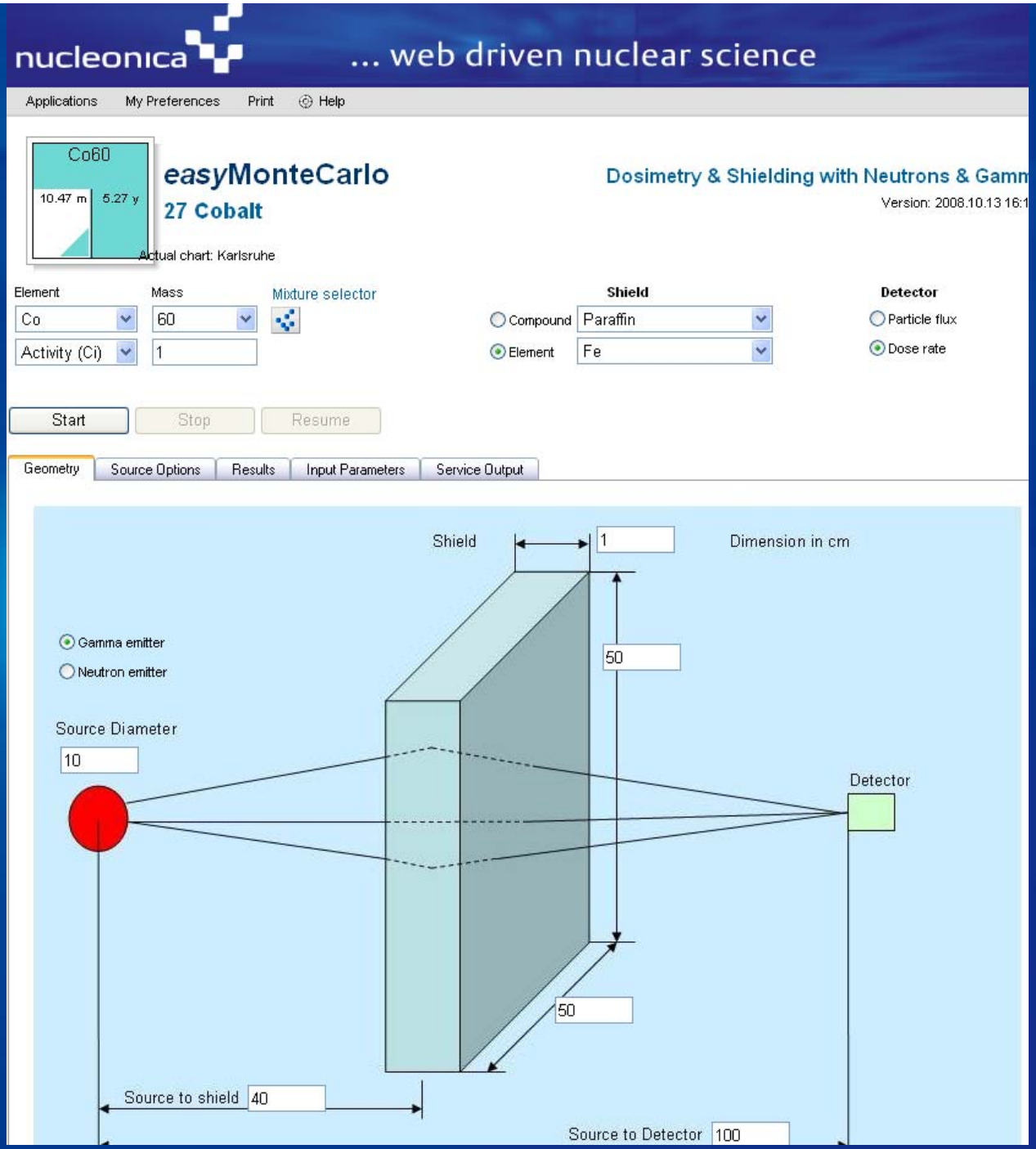
_easy_MonteCarlo:

easy to use, fast, accurate dosimetry and shielding calculations for gammas and neutrons using Nucleonica's powerful Monte Carlo engine. Investigate the effects of self-attenuation in the source, build-up effects in the shield etc., on the dose rate and the particle flux distribution at the detector…

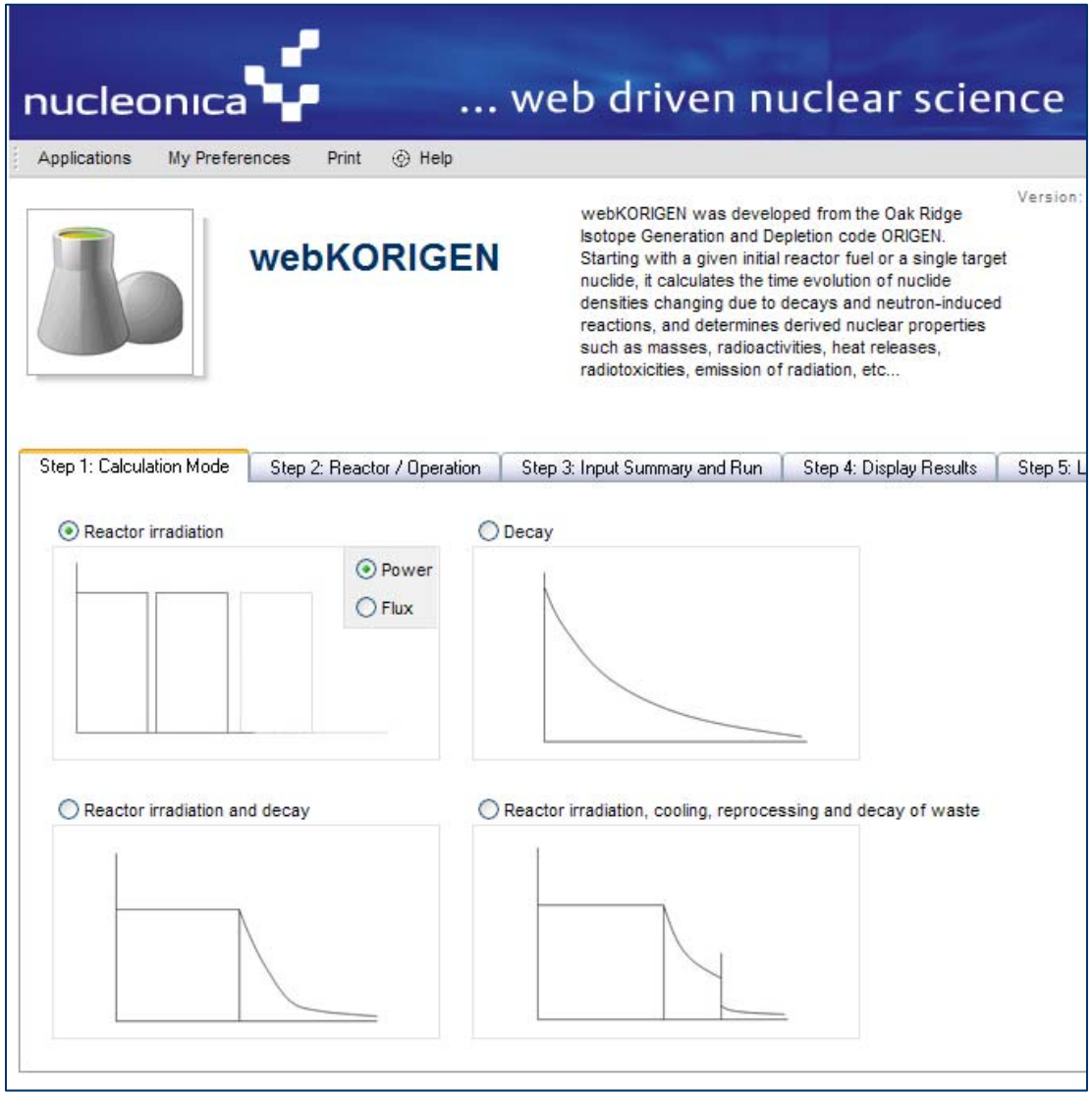
NUCLEONICA's *easyMonteCarlo* web-page showing the currently implemented shielding geometry…



NUCLEONICA: New Approach to Knowledge Management, Education and Training: use of social networking tools

Example: webKORIGEN

- KORIGEN is a legacy software code for fuel cycle calculations for PWR, BWR, FRs
- Over 30 man-years of development has gone into KORIGEN
- webKORIGEN is a Joint ITU/FZK development.
- webKORIGEN is a NUCLEONICA web-based application



Highlight:

webKORIGEN

nucleonica ... web driven nuclear science

Applications My Preferences Print Help

webKORIGEN

Step 1: Calculation Mode | Step 2: Reactor / Operation | Step 3: Input Summary and Run | St

Reactor irradiation

Power

Flux

Decay

Reactor irradiation and decay

Reactor irradiation, cooling, reprocessing

webKORIGEN

webKORIGEN was developed from the Oak Ridge Isotope Generation and Deplet
initial reactor fuel or a single target nuclide, it calculates the time evolution of nuc
neutron-induced reactions, and determines derived nuclear properties such as ma
radiotoxicities, emission of radiation, etc...

Step 1: Calculation Mode | Step 2: Reactor / Operation | Step 3: Input Summary and Run | Step 4: Display Results | Step 5: Log files | Step 6: Parameters

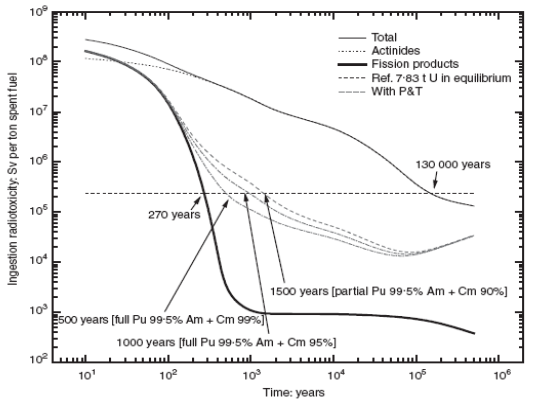
Display results for nuclides/elements dominant at 4.8 y irradiation

Display quantity: Mass (g) Filter:

Plot	Z	Nuclides	Results
	92	U238	1.840e+7
	94	Pu239	1.109e+5
	92	U236	1.089e+5
	92	U235	9.936e+4
	54	Xe136	7.742e+4
	94	Pu240	5.797e+4
	54	Xe134	5.047e+4
	56	Ba138	4.382e+4
	58	Ce140	4.168e+4
	57	La139	4.027e+4
	55	Cs137	4.018e+4
	60	Nd144	3.983e+4
	58	Ce142	3.782e+4
	54	Xe132	3.633e+4
	59	Pr141	3.622e+4
	55	Cs133	3.477e+4
	94	Pu241	3.474e+4
	42	Mo100	3.002e+4
	42	Mo98	2.864e+4
	40	Zr96	2.664e+4
0		793	2.000e+7

Plot	Z	Elements	Results
	92	Uranium	1.861e+7
	94	Plutonium	2.330e+5
	54	Xenon	1.744e+5
	60	Neodymium	1.214e+5
	40	Zirconium	1.169e+5
	42	Molybdenum	1.092e+5
	55	Cesium	9.239e+4
	58	Cerium	8.774e+4
	44	Ruthenium	7.773e+4
	56	Barium	5.028e+4
	46	Palladium	4.989e+4
	57	Lanthanum	4.035e+4
	59	Praseodymium	3.666e+4
	38	Strontium	2.786e+4
	43	Technetium	2.517e+4
	62	Samarium	2.334e+4
	93	Neptunium	1.752e+4
	39	Yttrium	1.474e+4
	45	Rhodium	1.227e+4
	36	Krypton	1.157e+4
0		60	2.000e+7

Plots	Totals	Nuclides	Elements	Results
	Actinides+Progenies:	**83**	**16**	**1.887e+7**
	Actinides:	65	8	1.887e+7
	Transuraniums:	40	4	2.608e+5
	Minor Actinides:	22	3	2.777e+4
	Inert Gases from actinides (Rn+He):	3	2	2.757e+1
	Fission Products:	**711**	**45**	**1.126e+6**
	Lanthanides:	137	12	3.255e+5
	Rare Earths:	178	14	3.525e+5
	Noble Metals:	87	4	1.415e+5



Conclusions: Key Advantages of Nucleonica

- Keep informed with the latest news on nuclear issues
- Use internationally evaluated nuclear data in your work
- Extensive range of nuclear science applications
- Manage all your data in a single browser-based system and keep track of your recent activities
- Prepare a lecture or a training course with Nucleonica materials (graphics. etc.)
- Prepare publication quality scientific graphs
- Stay in contact with your colleagues from previous employment, workshops or conferences
- Meet scientists from your areas of interest and build up an international contact list and represent yourself and your Institute/Organisation in the international science community

nucleonica

Thanks!

nucleonica